AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Cancelled)

2. (Currently Amended) A pump comprising:

a pump body ~~for at least partially defining~~ configured to at least partially define a pumping chamber;

a piezoelectric actuator situated in the pump body and responsive to a drive signal for pumping fluid in the pumping chamber;

a drive circuit ~~which applies~~ configured to apply the drive signal to the piezoelectric actuator as a series of high voltage charge packets configured to dynamically shape a waveform for the piezoelectric actuator as the actuator operates in the pump; and wherein the drive circuit further comprises:

a pulse ~~generator which generates~~generator configured to generate digital pulses, wherein the pulse generator comprises a pulsed width modulator (PWM) circuit;

a ~~converter circuit which uses~~converter circuit configured to use the digital pulses generated by the pulse generator to produce the series of high voltage charge packets.

3. (Previously Presented) The pump of claim 2, wherein the drive circuit further comprises the piezoelectric actuator, and wherein the piezoelectric actuator, by a capacitive nature of the piezoelectric actuator, integrates the charge packets to shape the waveform of the drive signal.

4. (Cancelled)

5. (Currently Amended) The pump of claim ~~[[4]]~~2, wherein the pulsed width modulator (PWM) circuit comprises a microcontroller.

6. (Currently Amended) The pump of claim [[4]]2, wherein the pulses generated by the pulsed width modulator (PWM) circuit have a pulse width chosen to produce a desired amplitude for the drive signal.

7. (Cancelled)

8. (Currently Amended) A method of operating a piezoelectric pump having a piezoelectric actuator situated in a pump body and responsive to a drive signal for pumping fluid, the method comprising:

(1) generating digital pulses~~:~~ and using a pulse width modulation circuit for modulating a pulse width of the digital pulses in accordance with a desired waveform for the drive signal;

(2) using the digital pulses of ~~step~~ act (1) to produce a series of high voltage charge packets configured to dynamically shape a waveform for the piezoelectric actuator as the actuator operates in the pump;

applying the series of high voltage charge packets as the drive signal to the piezoelectric actuator;

operating the piezoelectric actuator in the pump in response to the drive signal.

9. (Previously Presented) The pump of claim 8, further comprising using the piezoelectric actuator to integrate the charge packets and thereby shape the waveform of the drive signal.

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24. (Cancelled)

25. (Currently Amended) A pump comprising:

a pump body configured to at least partially define a pumping chamber;

a piezoelectric actuator situated in the pump body and responsive to a drive signal for pumping fluid in the pumping chamber; and

a drive circuit configured to produce the drive signal, the piezoelectric actuator forming a part of the drive circuit, wherein the drive circuit comprises:

a pulse generator configured to generate digital pulses;

a converter circuit configured to use the digital pulses generated by the pulse generator to produce high voltage charge packets configured to dynamically shape a waveform for the piezoelectric actuator as the actuator operates in the pump; and

wherein the piezoelectric actuator is configured, by a capacitive nature of the piezoelectric actuator, to integrate the charge packets to shape the waveform of the drive signal~~The pump of claim 24,~~;

wherein the pulse generator comprises a pulsed width modulator (PWM) circuit.

26. (Currently Amended) The pump of claim ~~24~~25, wherein the pulsed width modulator (PWM) circuit comprises a microcontroller.

27. (Currently Amended) The pump of claim ~~24~~25, wherein the digital pulses generated by the pulsed width modulator (PWM) circuit have a pulse width chosen to produced a desired amplitude for the drive signal.

28. (Currently Amended) A pump comprising:

a pump body configured to at least partially define a pumping chamber;

a piezoelectric actuator situated in the pump body and responsive to a drive signal for pumping fluid in the pumping chamber; and

a drive circuit configured to produce the drive signal, the piezoelectric actuator forming a part of the drive circuit, wherein the drive circuit comprises:

a pulse generator configured to generate digital pulses;

a converter circuit configured to use the digital pulses generated by the pulse generator to produce high voltage charge packets configured to dynamically shape a waveform for the piezoelectric actuator as the actuator operates in the pump; and

wherein the piezoelectric actuator is configured, by a capacitive nature of the piezoelectric actuator, to integrate the charge packets to shape the waveform of the drive signal; ~~The pump of claim 24,~~

wherein the converter circuit comprises a flyback circuit.

29. (Currently Amended) The pump of claim ~~24~~28, wherein the flyback circuit produces potentials that are bipolar with respect to an electrical ground.

30. (Currently Amended) A pump comprising:

a pump body configured to at least partially define a pumping chamber;

a piezoelectric actuator situated in the pump body and responsive to a drive signal for pumping fluid in the pumping chamber; and

a drive circuit configured to produce the drive signal, the piezoelectric actuator forming a part of the drive circuit, wherein the drive circuit comprises:

a pulse generator configured to generate digital pulses;

a converter circuit configured to use the digital pulses generated by the pulse generator to produce high voltage charge packets configured to dynamically shape a waveform for the piezoelectric actuator as the actuator operates in the pump; and

wherein the piezoelectric actuator is configured, by a capacitive nature of the piezoelectric actuator, to integrate the charge packets to shape the waveform of the drive signal; ~~The pump of claim 24, further comprising~~

a filter ~~for configured to~~ filter~~ing~~ components of the charge packets produced by the converter circuit.

31. (Currently Amended) A pump comprising:

a pump body configured to at least partially define a pumping chamber;

a piezoelectric actuator situated in the pump body and responsive to a drive signal for pumping fluid in the pumping chamber; and

a drive circuit configured to produce the drive signal, the piezoelectric actuator forming a part of the drive circuit, wherein the drive circuit comprises:

a pulse generator configured to generate digital pulses;

a converter circuit configured to use the digital pulses generated by the pulse generator to produce high voltage charge packets configured to dynamically shape a waveform for the piezoelectric actuator as the actuator operates in the pump; and

wherein the piezoelectric actuator is configured, by a capacitive nature of the piezoelectric actuator, to integrate the charge packets to shape the waveform of the drive signal; ~~The pump of claim 24,~~

wherein a frequency of the pulses produced by the converter circuit is greater than an ability of the piezoelectric actuator to mechanically respond.

32. (Original) The pump of claim 31, wherein the frequency of the charge packets produced by the converter circuit is chosen to be greater than an ability of the piezoelectric actuator to mechanically respond so that the charge packets produced by the converter circuit do not contribute to one of mechanical inefficiency and noise in the piezoelectric actuator.

33. (Currently Amended) A pump comprising:

a pump body configured to at least partially define a pumping chamber;

a piezoelectric actuator situated in the pump body and responsive to a drive signal for pumping fluid in the pumping chamber; and

a drive circuit configured to produce the drive signal, the piezoelectric actuator forming a part of the drive circuit, wherein the drive circuit comprises:

a pulse generator configured to generate digital pulses;

a converter circuit configured to use the digital pulses generated by the pulse generator to produce high voltage charge packets configured to dynamically shape a waveform for the piezoelectric actuator as the actuator operates in the pump; and

wherein the piezoelectric actuator is configured, by a capacitive nature of the piezoelectric actuator, to integrate the charge packets to shape the waveform of the drive signal; ~~The pump of claim 24,~~

wherein the charge packets comprise positive pulses and negative pulses, and wherein the piezoelectric actuator integrates the positive pulses and the negative pulses to yield a drive field that approximates a sine wave.

34. (Original) A pump comprising:

a pump body configured to at least partially define a pumping chamber;

a piezoelectric actuator situated in the pump body and responsive to a drive signal for pumping fluid in the pumping chamber; and

a drive circuit configured to produce the drive signal, the piezoelectric actuator forming a part of the drive circuit, wherein the drive circuit comprises:

a pulse generator configured to generate digital pulses;

a converter circuit configured to use the digital pulses generated by the pulse generator to produce high voltage charge packets configured to dynamically shape a waveform for the piezoelectric actuator as the actuator operates in the pump; and

wherein the piezoelectric actuator is configured, by a capacitive nature of the piezoelectric actuator, to integrate the charge packets to shape the waveform of the drive signal; ~~The pump of claim 24,~~

wherein neither a bridge switching circuit nor a charge storage circuit are connected between the converter circuit and the piezoelectric actuator.

35. (Cancelled)

36. (Currently Amended) A pump comprising:

a pump body ~~for at least partially defining~~ configured to at least partially define a pumping chamber;

a piezoelectric actuator situated in the pump body and responsive to a drive signal for pumping fluid in the pumping chamber;

a power supply; and

a drive circuit which is powered by the power supply and which ~~produces~~ is configured to produce the drive signal, wherein the drive circuit comprises:

a pulse ~~generator which generates~~generator configured to generate digital pulses, the pulse generator comprising a pulsed width modulator (PWM) circuit;

a ~~converter circuit which uses~~converter circuit configured to use the digital pulses generated by the pulse generator to produce high voltage charge packets; and

wherein the piezoelectric actuator, by a capacitive nature of the piezoelectric actuator, integrates the charge packets to dynamically shape a waveform for the piezoelectric actuator as the actuator operates in the pump.

37. (Cancelled)

38. (Original) The pump of claim 36, wherein the charge packets comprise positive pulses and negative pulses, and wherein the piezoelectric actuator integrates the positive pulses and the negative pulses to yield a drive field that approximates a sine wave.

39. (Currently Amended) The pump of claim ~~37~~36, wherein the digital pulses generated by the pulsed width modulator (PWM) circuit have a pulse width chosen to produced a desired amplitude for the drive signal.

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74. (Currently Amended) A pump comprising:

a pump body ~~for at least partially defining~~ configured to at least partially define a pumping chamber;

a piezoelectric actuator situated in the pump body and responsive to a drive signal for pumping fluid in the pumping chamber; and

a drive circuit ~~which applies~~configured to apply the drive signal to the piezoelectric actuator as a series of digital pulses, wherein the drive circuit comprises:

a source of digital pulses;

a transformer;

a power switching element ~~which receives~~configured to receive the digital pulses and to selectively ~~applies~~ apply current to the transformer;

means for using an electromotive force generated by parasitic capacitance of the transformer to provide a high voltage bipolar output to the piezoelectric actuator.

75. (Previously Presented) The apparatus of claim 74, wherein the transformer is has only one secondary winding with no taps.

76. (Previously Presented) The apparatus of claim 74, wherein the source produces a single PWM pulse train.

77. (Previously Presented) The apparatus of claim 74, wherein the source produces a unipolar, low frequency, low potential control signal to the means for using an electromotive force.

78. (Previously Presented) The apparatus of claim 74, further comprising a second transformer connected in parallel to the transformer